Chapter 3: Understanding NASIS Objects, Tables, and Elements

The first new concept in NASIS 6 is that it is now a client-server application. NASIS 6 software and local database resides on the local computer. Data must be queried from the National Database to populate the Local Database. In order to use data, this chapter will run queries against the national database in order to populate the local database and the selected set to explain the multiple objects and tables. Further information on building the selected set is available in Chapter 4. This chapter will explain the details of NASIS objects and the process of building the NASIS local database on the user's local computer.

NASIS Data Structure

Chapter 1 introduced the concept of objects and tables in NASIS. NASIS provides the capability to manage two general categories of soil survey data, commonly referred to as the Aggregated Data and the Point Data. The Aggregated Data structure includes a set of objects and related tables needed to document the soil map units and components and associate the map units with a soil survey area legend. The Legend/Map Unit/Data Mapunit Data Structure Diagram shows the objects and tables that make up the Aggregate Data.

The Point Data structure includes the objects and tables needed to manage the site and pedon descriptions collected in the field. The Site Association/Site/Pedon/Transect Data Structure Diagram shows the objects and tables associated with the Point data.

Downloadable versions of these data structure diagrams can be found on the NASIS web site (http://soils.usda.gov/technical/nasis/documents/index.html). The remainder of this chapter will focus on the Legend/Map Unit/Data Mapunit Data Structure and the NASIS Aggregated Data.

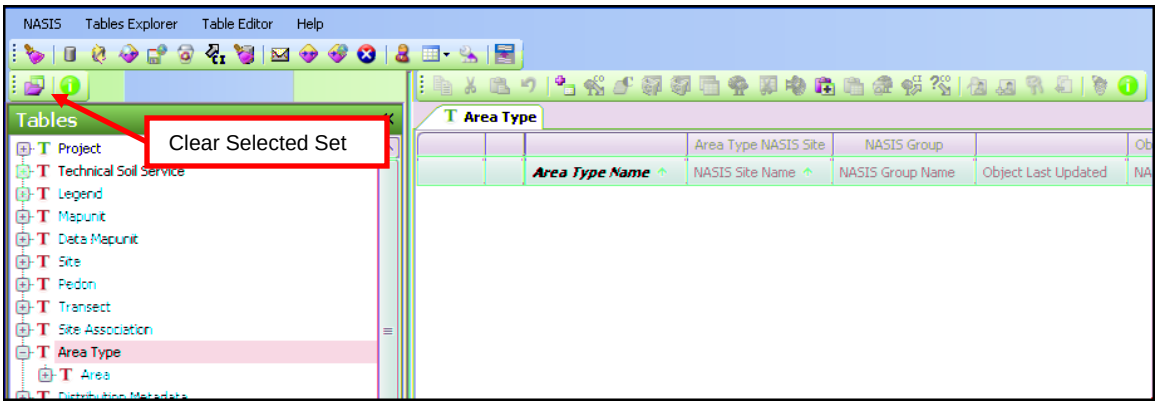
NASIS Aggregate Data

The major objects of the aggregated data are the "**Area Type**", "**Legend**", "**Mapunit**" and "**Data Mapunit**". A new object has been introduced with the release of NASIS 6.0. The **Mapunit** Object contains the *mapunit* table that was previously contained within the Legend Object. The MLRA concept of updating soil surveys provided the impetus to move the mapunit table into a new object, thereby allowing a map unit to be shared across multiple legends. This move facilitates the seamless join of map units, with its unique national map unit symbol, across the country.

The Area Type Object

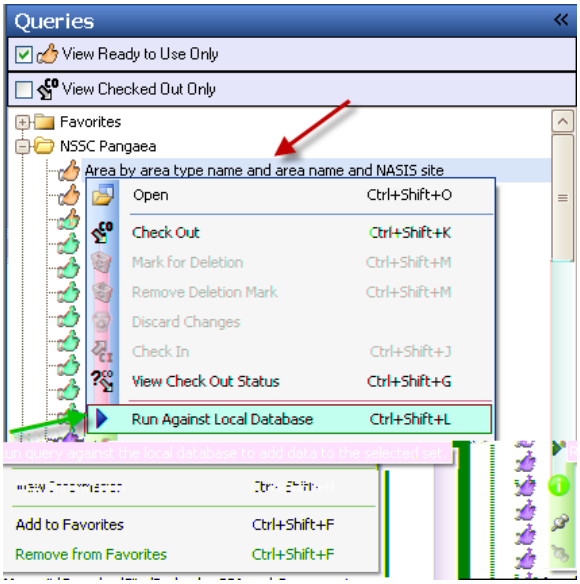
NASIS stores more than just traditional soil survey areas. Because there are several kinds of areas, they are organized by *area type.*

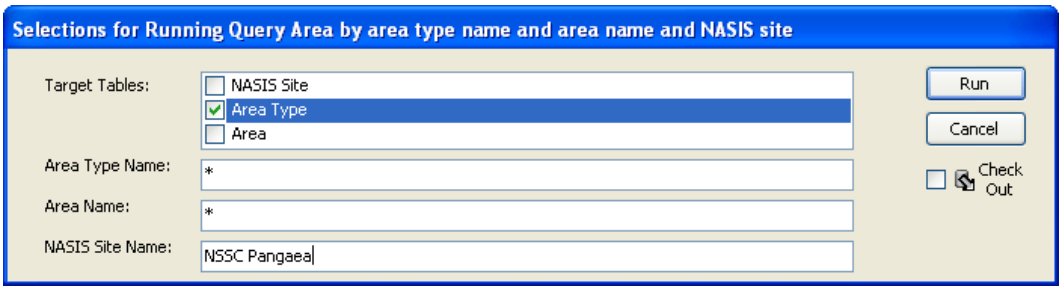
In the Tables Explorer, open the Area Type table by double-clicking on Area Type or highlighting the table and choosing Open on the Explorer menu or right click on the table and chose Open. The table should be empty, if not then clear the Selected Set using the whisk broom icon found on the NASIS toolbar or Clear Selected Set from the NASIS menu.



Querying Area Types

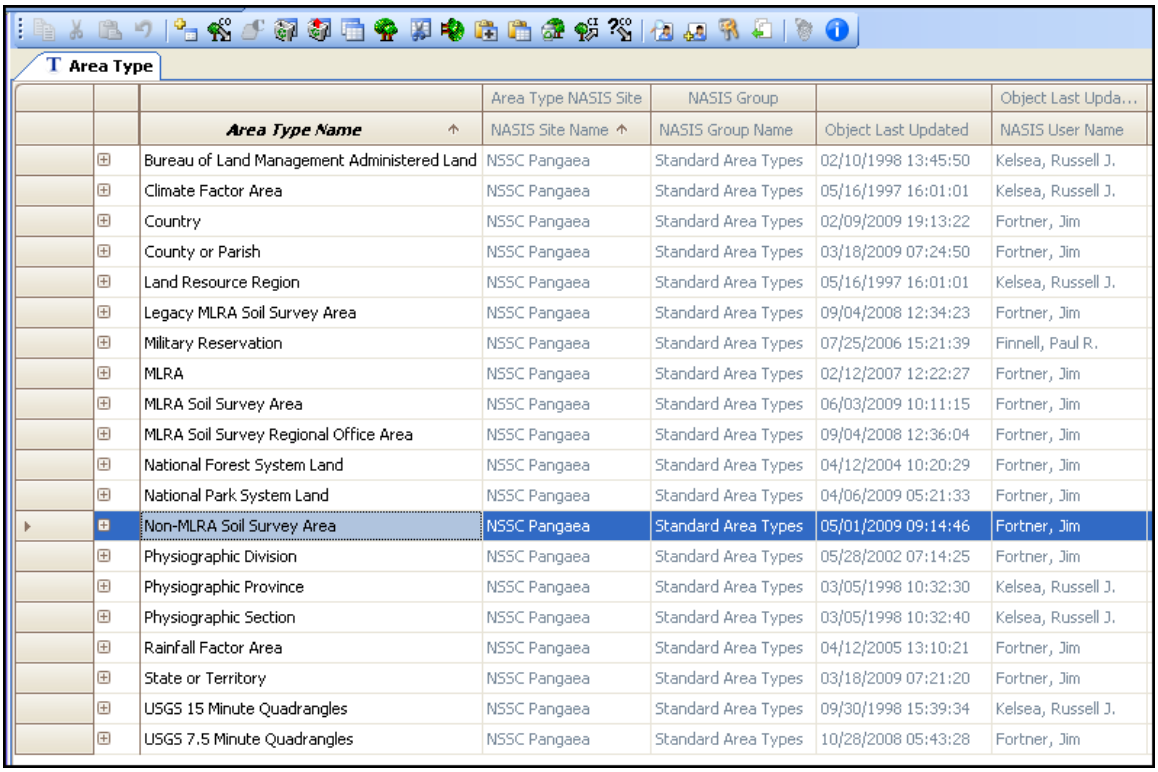
Choose the Query Explorer and right click on the national query named "*Area by area type name and area name and NASIS Site*" and **Run Against Local Database**:





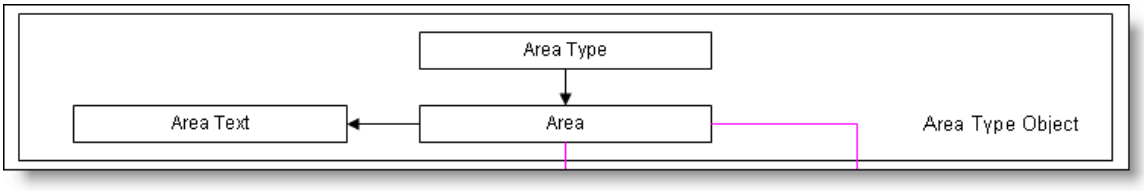
Enter the parameters as presented in the image above –
Choose Area Type as the Target Table,
Enter an asterisk (*) for the Area Type Name and
Enter an asterisk (*) for the Area Name, and
Enter "NSSC Pangaea" as the NASIS Site name (or "*pan*").

The data within the Area Type Object is loaded into the local database at the time of Initialization and is refreshed with changes when the "Refresh local database" is chosen. It is not necessary to run this query against the national database. The result should be 20 rows of Area Type data.

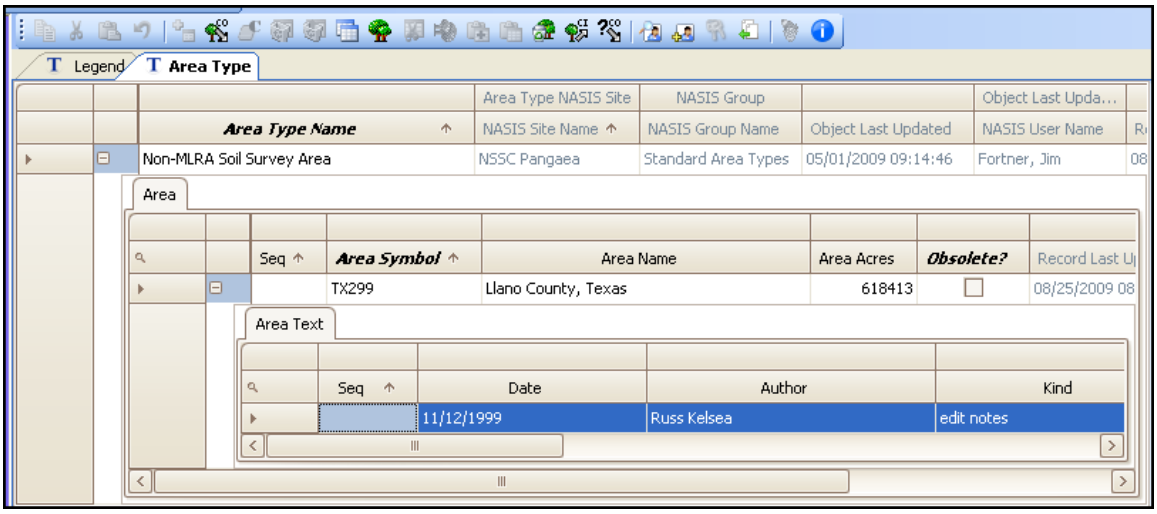

Area Type

	Area Type Name	Area Type NASIS Site	NASIS Group		Object Last Upda...
		NASIS Site Name	NASIS Group Name	Object Last Updated	NASIS User Name
⊞	Bureau of Land Management Administered Land	NSSC Pangaea	Standard Area Types	02/10/1998 13:45:50	Kelsea, Russell J.
⊞	Climate Factor Area	NSSC Pangaea	Standard Area Types	05/16/1997 16:01:01	Kelsea, Russell J.
⊞	Country	NSSC Pangaea	Standard Area Types	02/09/2009 19:13:22	Fortner, Jim
⊞	County or Parish	NSSC Pangaea	Standard Area Types	03/18/2009 07:24:50	Fortner, Jim
⊞	Land Resource Region	NSSC Pangaea	Standard Area Types	05/16/1997 16:01:01	Kelsea, Russell J.
⊞	Legacy MLRA Soil Survey Area	NSSC Pangaea	Standard Area Types	09/04/2008 12:34:23	Fortner, Jim
⊞	Military Reservation	NSSC Pangaea	Standard Area Types	07/25/2006 15:21:39	Finnell, Paul R.
⊞	MLRA	NSSC Pangaea	Standard Area Types	02/12/2007 12:22:27	Fortner, Jim
⊞	MLRA Soil Survey Area	NSSC Pangaea	Standard Area Types	06/03/2009 10:11:15	Fortner, Jim
⊞	MLRA Soil Survey Regional Office Area	NSSC Pangaea	Standard Area Types	09/04/2008 12:36:04	Fortner, Jim
⊞	National Forest System Land	NSSC Pangaea	Standard Area Types	04/12/2004 10:20:29	Fortner, Jim
⊞	National Park System Land	NSSC Pangaea	Standard Area Types	04/06/2009 05:21:33	Fortner, Jim
⊞	Non-MLRA Soil Survey Area	NSSC Pangaea	Standard Area Types	05/01/2009 09:14:46	Fortner, Jim
⊞	Physiographic Division	NSSC Pangaea	Standard Area Types	05/28/2002 07:14:25	Fortner, Jim
⊞	Physiographic Province	NSSC Pangaea	Standard Area Types	03/05/1998 10:32:30	Kelsea, Russell J.
⊞	Physiographic Section	NSSC Pangaea	Standard Area Types	03/05/1998 10:32:40	Kelsea, Russell J.
⊞	Rainfall Factor Area	NSSC Pangaea	Standard Area Types	04/12/2005 13:10:21	Fortner, Jim
⊞	State or Territory	NSSC Pangaea	Standard Area Types	03/18/2009 07:21:20	Fortner, Jim
⊞	USGS 15 Minute Quadrangles	NSSC Pangaea	Standard Area Types	09/30/1998 15:39:34	Kelsea, Russell J.
⊞	USGS 7.5 Minute Quadrangles	NSSC Pangaea	Standard Area Types	10/28/2008 05:43:28	Fortner, Jim

The area types stored in NASIS appear. NASIS stores National Park Service Lands, National Forest Lands, Military Reservations, Land Resource Regions, and many more. Notice that in NASIS, climate and rainfall factor areas, and political and physiographic areas are all stored, in addition to soil survey areas.



The Area Type Object is comprised of three tables; the Area Type, Area and the Area Text tables. Navigate through the various Area Types to understand those contained in NASIS. Click on the plus sign (+) to the left of **Non-MLRA Soil Survey Area** to open the child tables and explore the various survey areas:

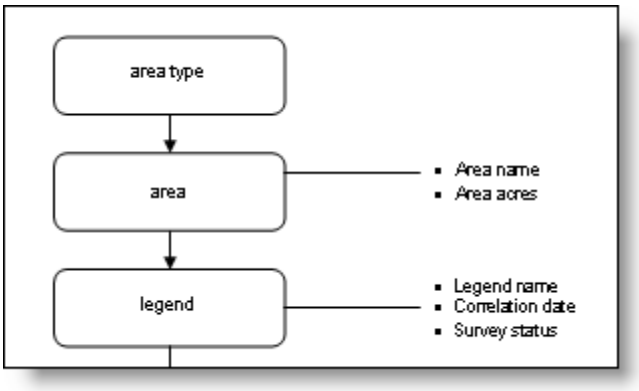


In the image above, the Area table and Area Text table is now displayed. Scroll to the right to identify the various columns within the tables. It shows the record associated with the *Non-MLRA Soil Survey Area Type*. The **Area Type** is the parent table and the **Area** is the child table. Also, the **Area Text** table is a child table to its parent **Area** table. These three tables create the **Area Type object.**

Continue to investigate the various Area Types, *however be advised that opening the two 7.5 and 15 min USGS Quadrangle Area Types will take a* ***very long time*** *to build the thousands of records into these tables.*

The Legend Object

The soil survey area is independent from the legend. The following illustration provides a visual explanation of the separation of area from legend.

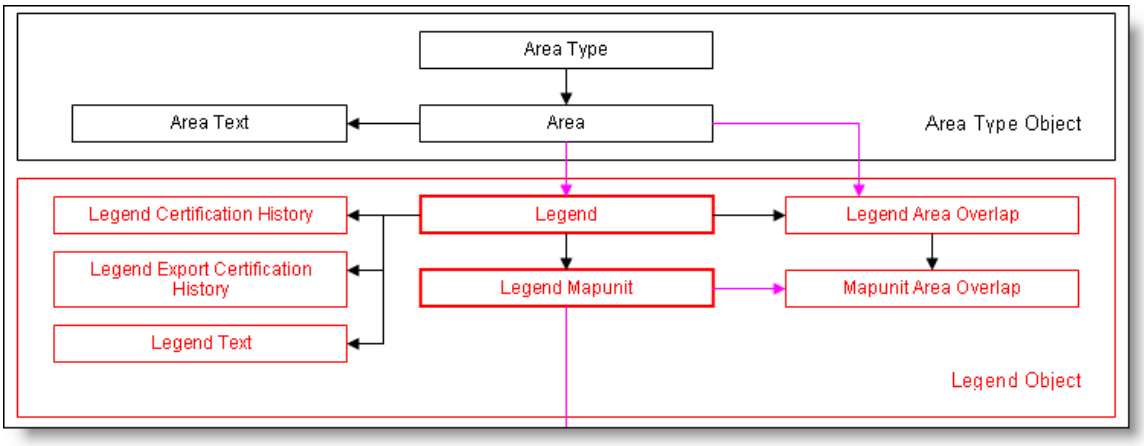


Separation of Soil Survey Area and Legend

One area can have multiple legends (a 1 to many relationship). For example, Pike County, Illinois can have both an out-of-date legend and an updated legend. Each legend, however, can be part of only one survey area (Pike County, Illinois). There are only two National Area Types in which legends are linked, the **Non-MLRA Soil Survey Area** and the **MLRA Soil Survey Areas**.

Because the area type object and the legend object are independent, navigating to the legend for a particular survey area requires a leap across object boundaries from the **Area** table to the **Legend** table, as shown in the following figure.

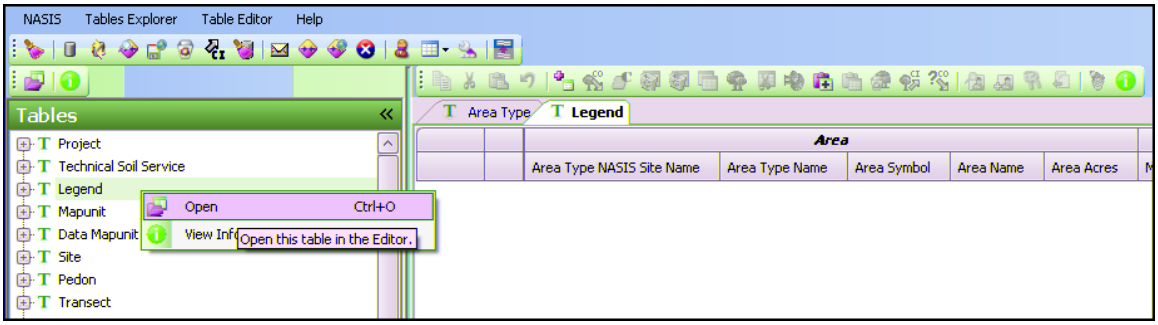
This figure below presents both the Area Type and the Legend Objects. Object boundaries are marked by the larger black line and larger red line rectangles. The purple lines between tables in the two objects indicate crossing points for moving from one object (Area Type) to another (Legend).



Legends are stored only for MLRA soil survey area and Non-MLRA soil survey area types.

Locating object boundaries

In the Tables Explorer, open the **Legend** table**.**

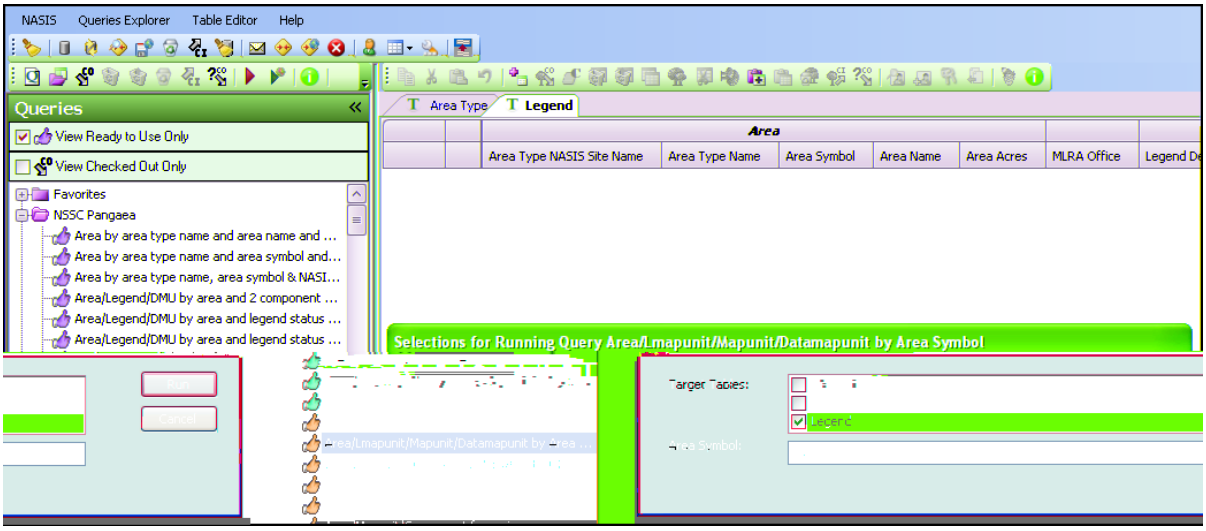


The table is empty because data was loaded into the Area Type Object but not into the Legend Object. The query was **Run Against the Local Database** to load the 20 national Area Types into the selected set. To load data into the Legend Object the data must be queried from the national database. Since Areas are independent of the Legend Objects, the Legends must be queried from the National Database to populate the Local Database and then queried from the Local Database into the Selected Set to view data in the Legend table.

A short digression is required to load the Local Database with data before proceeding with this chapter. This exercise will take about 30 minutes and will load the Local Database with data for future use.

Using a query to load data from the national database

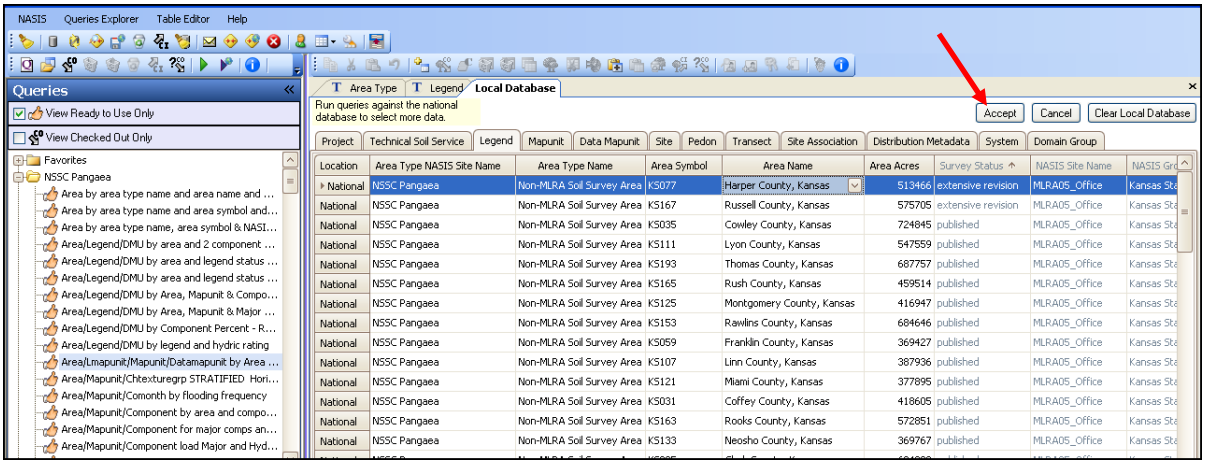
Select the National query: "*Area/Lmapunit/Mapunit/Datamapunit by Area Symbol*". This query will be run using the option "**Run Against National Database**".



Choose "Legend" as the target table. Only one Target Table is allowed for the national queries. Area Type is not an option since the Area Type object is preloaded into the Local Database.

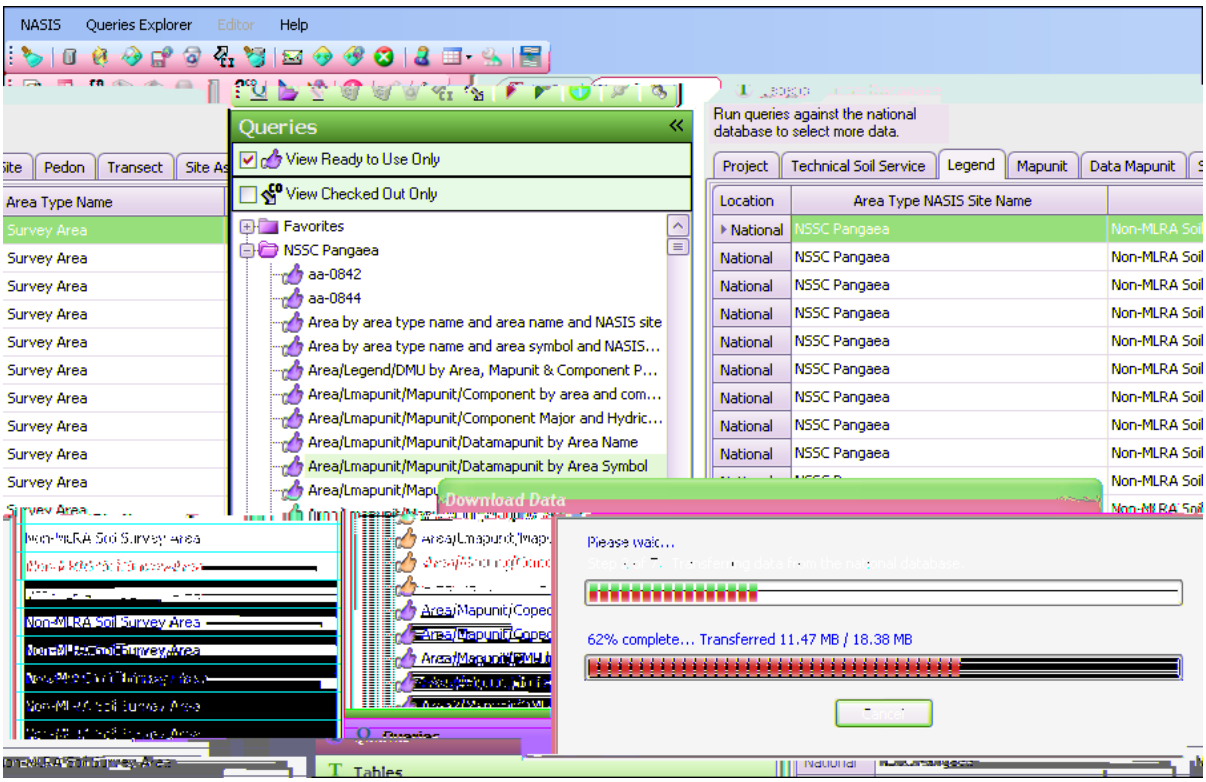
Select the state of interest, in this example all of the legends in Kansas will be loaded using the two character state code with a wildcard "KS*". Choose any state.

It will take approximately two minutes to run the query and display the selected surveys in the "Local Database Setup".

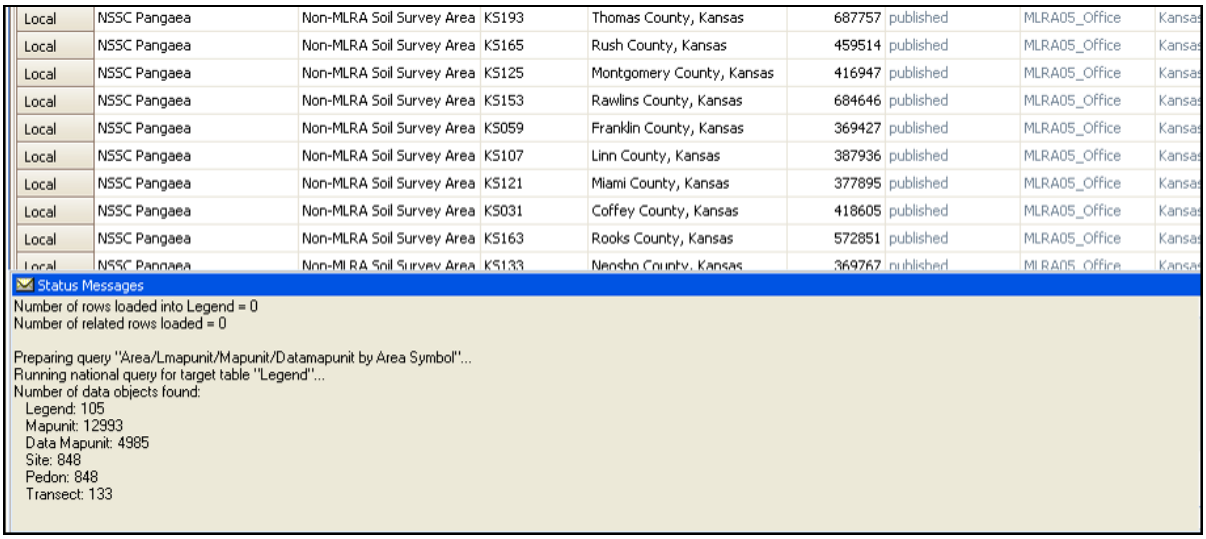


Click on the "Accept" button to choose the selected data to download to the local database. This may take 30 minutes (25 mb) or more to download the data depending on the size of the dataset and the speed of the internet connection. This query will retrieve all the Legends, Mapunit, Datamapunits, linked Pedons and linked Sites for the selected state.

Although a significant amount of time is used to download large datasets, the intent is to download this data once. The local database will be subsequently refreshed on a regular basis to retrieve any edits posted to the national database by other users.

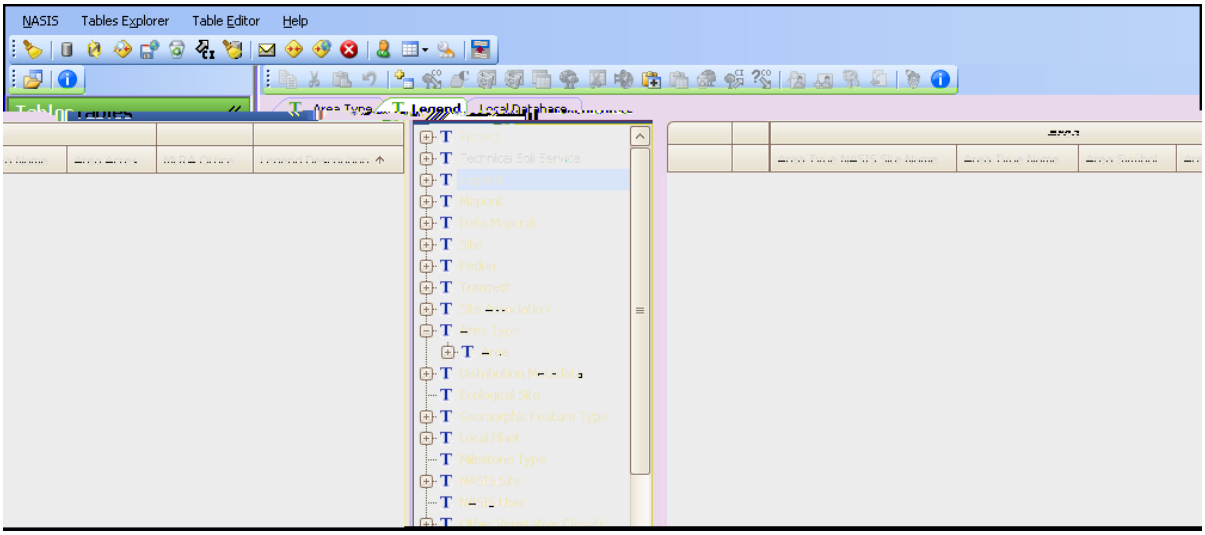


Upon completion, the Status Messages panel will identify the data downloaded from the National database. The object tabs can be reviewed for data loaded into the local database.



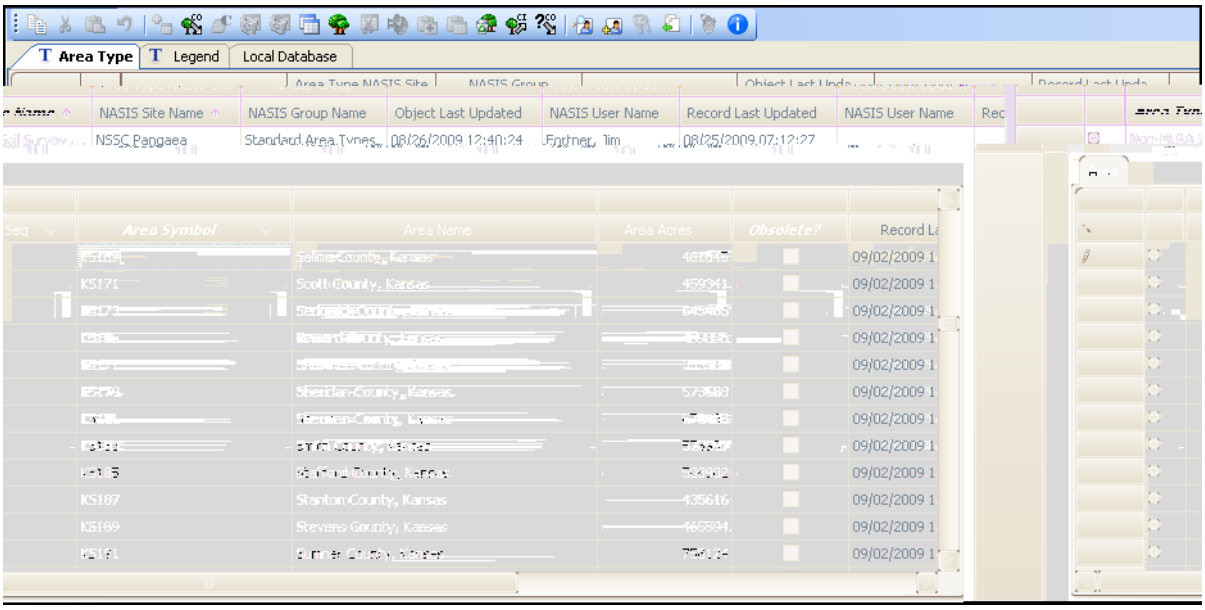
Loading the Legend table

Now that data is populated into the Local Database, return to the **Legend** table. As a reminder, the local database has now been populated with data. The Local Database must now be queried to populate the selected set – the Legend table.



Return to the Area Type tab and select an Area from the list within the Non-MLRA Soil Survey Area. For this exercise to work properly, the user must select an Area that was downloaded from the National Query and is available in the Local Database.

For this example, Saline County, Kansas has been selected:

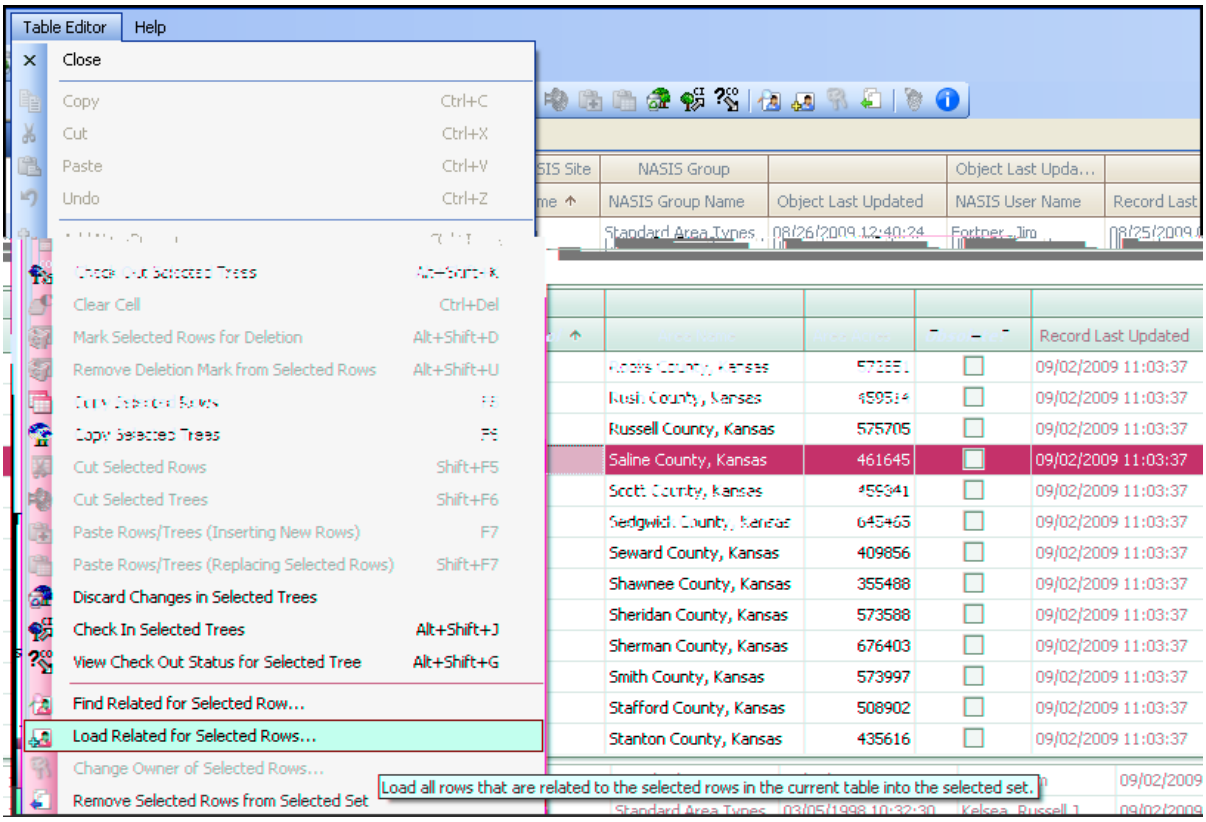


Crossing from area table to legend table

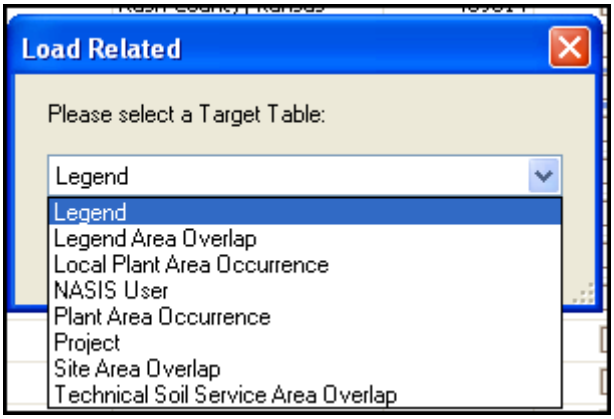
Returning to the explanation of data base objects, the next step is to populate the selected set. There are two methods of loading the **Legend** data for Saline County, Kansas "Non-MLRA Soil Survey Area". Either:

1. Run a query – "Run Against the Local Database", or
2. Use the "Load Related for Selected Rows".

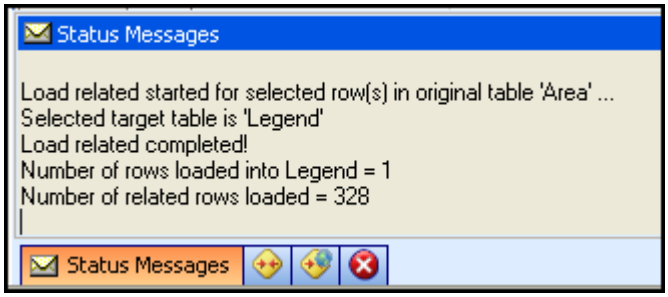
For this exercise the "Load Related for Selected Rows" will be used. In this example, the KS169 "Saline County, Kansas" row is highlighted and from the Table Editor menu the "Load Related for Selected Rows" is chosen:



A choice list box will appear containing those tables that are related to the Area table. For this example choose the “Legend” table.

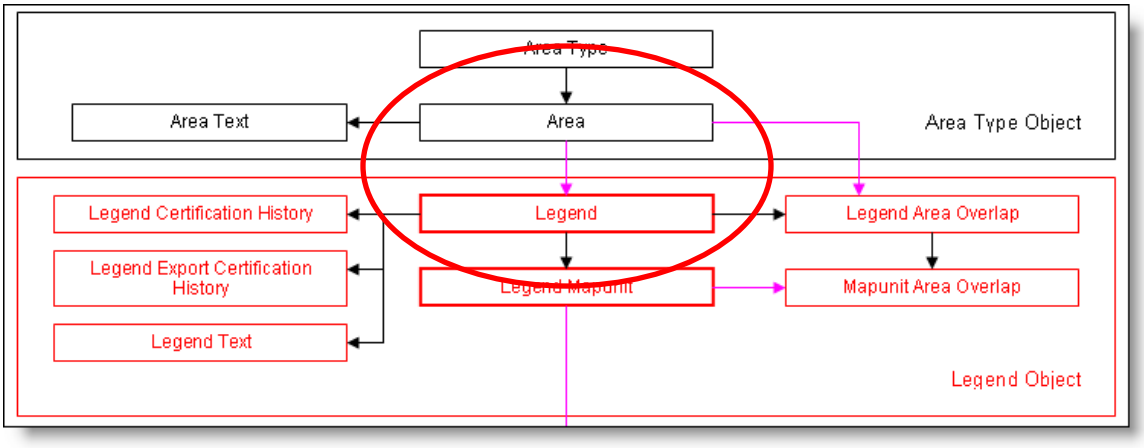


The Status Messages panel will identify the data loaded from the local database into the selected set for the Legend table:

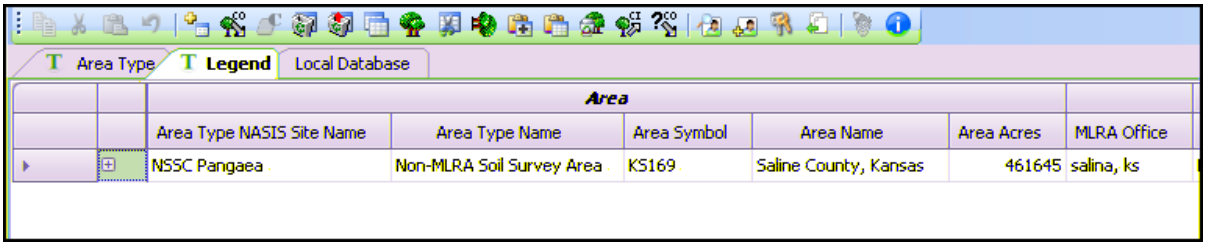


To review this process:

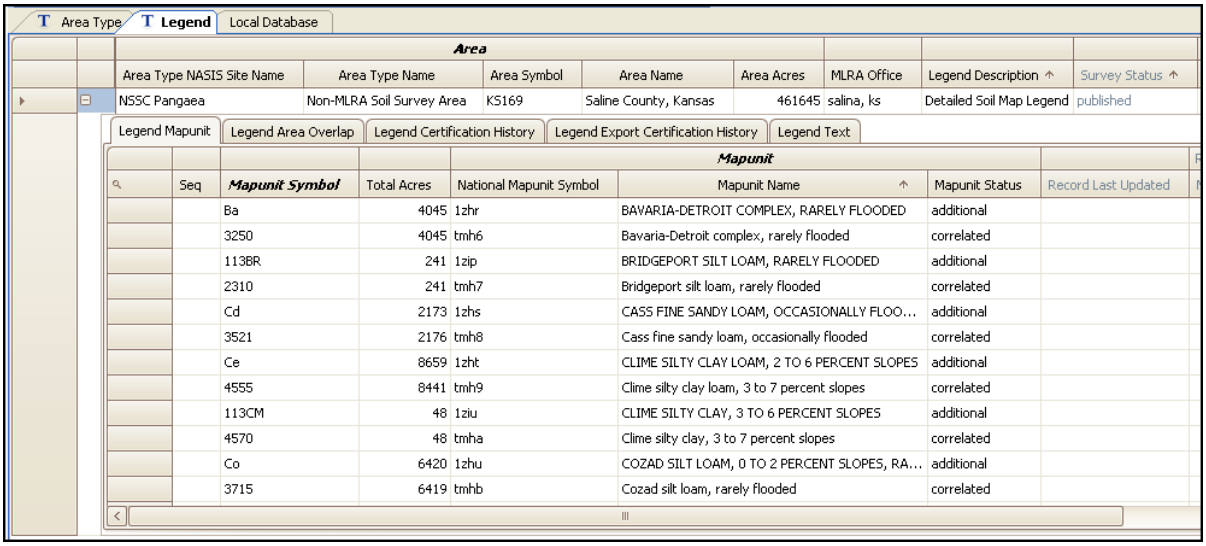
1. The data in the Area Type object is preloaded into the *Local Database* at the time of the database "initialization".
2. A query was "*Run Against Local Database*" to load the national Area Types into the *selected set*.
3. A query was "*Run Against National Database*" to download a state dataset to populate the local database.
4. Returning to the Area Type table, the Non-MLRA Soil Survey Area table was opened, a survey from the list was highlighted and the "*Load Related for Selected Rows*" command was used to load the Legend that is related to the chosen Area.
5. A second method would be to run the same query using "*Run Against Local Database*" to populate Legend data into the selected set.
6. This example crosses the Area Type Object and the Legend Object by loading the Legend(s) for the selected Area.



Return to the Legend table tab. The **Legend** table is now populated with the Saline County, Kansas Non-MLRA Soil Survey Area (or whichever legend the user has chosen). Using the Load Related function, the Area Type Object and the Legend Object has been "crossed".



Open the Legend child tables by clicking on the plus (+) sign on the left side of the row in the Legend table or by “double-clicking” on the space to the left of the plus (+) sign.



Area Type | Legend | Local Database

Area

Area Type NASIS Site Name	Area Type Name	Area Symbol	Area Name	Area Acres	MLRA Office	Legend Description	Survey Status
NSSC Pangaea	Non-MLRA Soil Survey Area	KS169	Saline County, Kansas	461645	salina, ks	Detailed Soil Map Legend	published

Legend Mapunit | Legend Area Overlap | Legend Certification History | Legend Export Certification History | Legend Text

Mapunit

Seq	Mapunit Symbol	Total Acres	National Mapunit Symbol	Mapunit Name	Mapunit Status	Record Last Updated
	Ba	4045	1zhr	BAVARIA-DETROIT COMPLEX, RARELY FLOODED	additional	
	3250	4045	tmh6	Bavaria-Detroit complex, rarely flooded	correlated	
	113BR	241	1zip	BRIDGEPORT SILT LOAM, RARELY FLOODED	additional	
	2310	241	tmh7	Bridgeport silt loam, rarely flooded	correlated	
	Cd	2173	1zhs	CASS FINE SANDY LOAM, OCCASIONALLY FLOO...	additional	
	3521	2176	tmh8	Cass fine sandy loam, occasionally flooded	correlated	
	Ce	8659	1zht	CLIME SILTY CLAY LOAM, 2 TO 6 PERCENT SLOPES	additional	
	4555	8441	tmh9	Clime silty clay loam, 3 to 7 percent slopes	correlated	
	113CM	48	1ziu	CLIME SILTY CLAY, 3 TO 6 PERCENT SLOPES	additional	
	4570	48	tmha	Clime silty clay, 3 to 7 percent slopes	correlated	
	Co	6420	1zhu	COZAD SILT LOAM, 0 TO 2 PERCENT SLOPES, RA...	additional	
	3715	6419	tmhb	Cozad silt loam, rarely flooded	correlated	

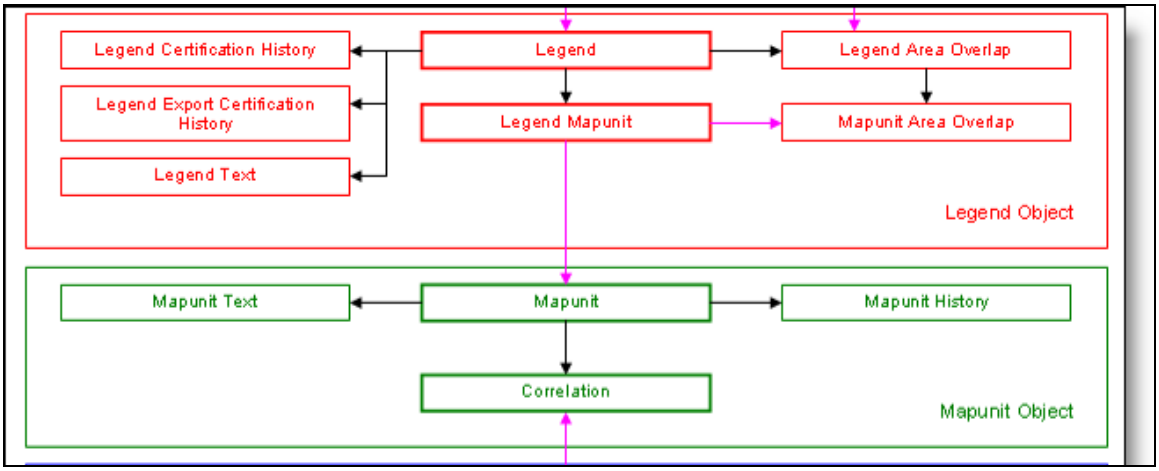
The Legend Object, displayed above, contains the child tables used to manage the map units within the specific soil survey area legend. In a later lesson the columns of the tables in the Legend Object will be examined. This lesson focuses exclusively on navigating objects and understanding the NASIS structure.

Examine each column in the Legend table scrolling to the right to view all columns. The Legend table stores the legend description, geographic applicability, and certification status. Remember from Chapter 2 to use the View Information button to obtain information about any table or data element. The two fields “survey status” and “correlation date” are now obsolete fields and no longer available for editing. The update of soil surveys has focused the emphasis from the status of “Legends” to the status of “Mapunits”.

The Mapunit Object

The Area Type Object has been loaded and reviewed.
The Legend Object has had a survey loaded and reviewed.

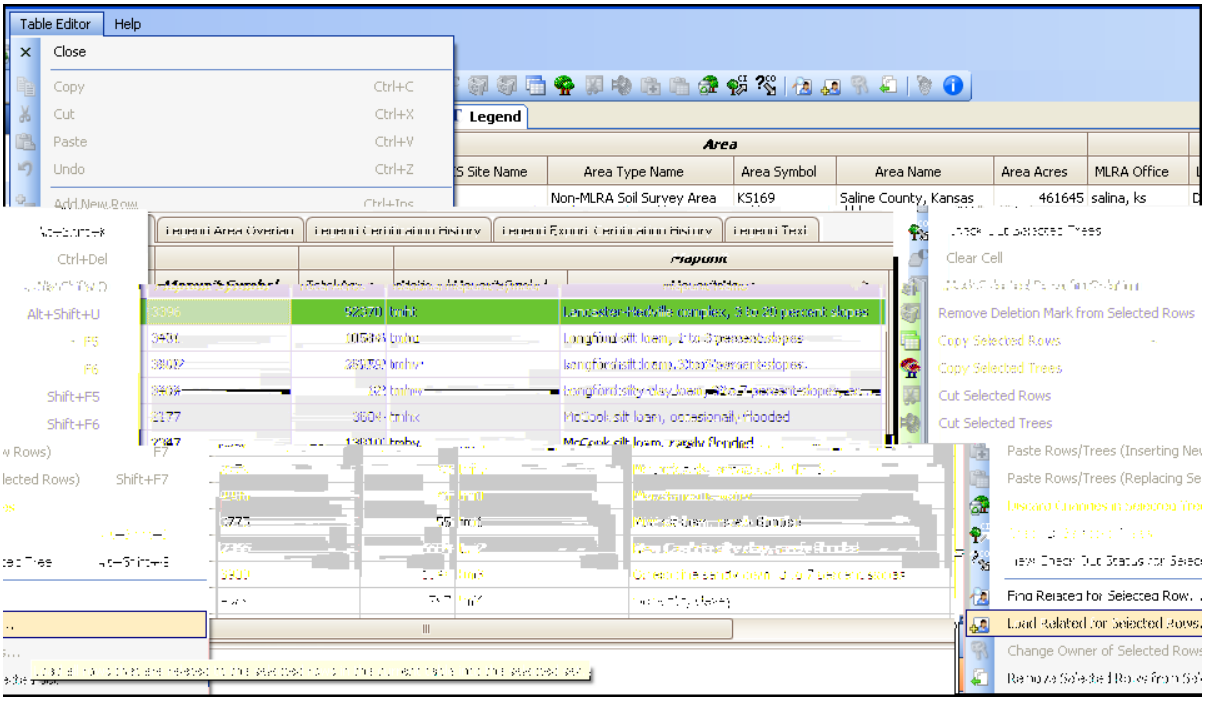
The Mapunit Object is a new object in NASIS 6.0. The Mapunit Object was created to manage map units across multiple survey legends. The boundaries between these independent objects will be crossed using the Load Related command to load data into the Mapunit Object.



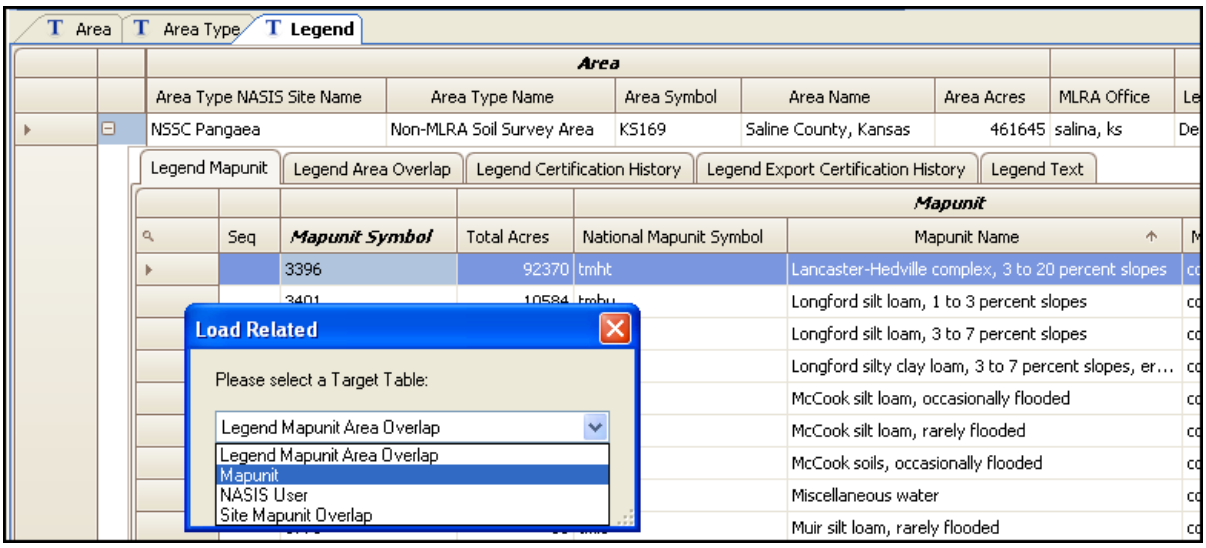
Crossing Between Legend, Mapunit, and Data Mapunit Objects

The Mapunit Object manages the map unit providing the map unit documentation and the links to the map unit data. Return to NASIS to load data into the Mapunit Object from a selection in the Legend Object.

In this step, in the Legend Mapunit table, the “Lancaster-Hedville complex, 3 to 20 percent slopes” mapunit is highlighted and the “Load Related for Selected Rows” is chosen from the Table Editor menu.

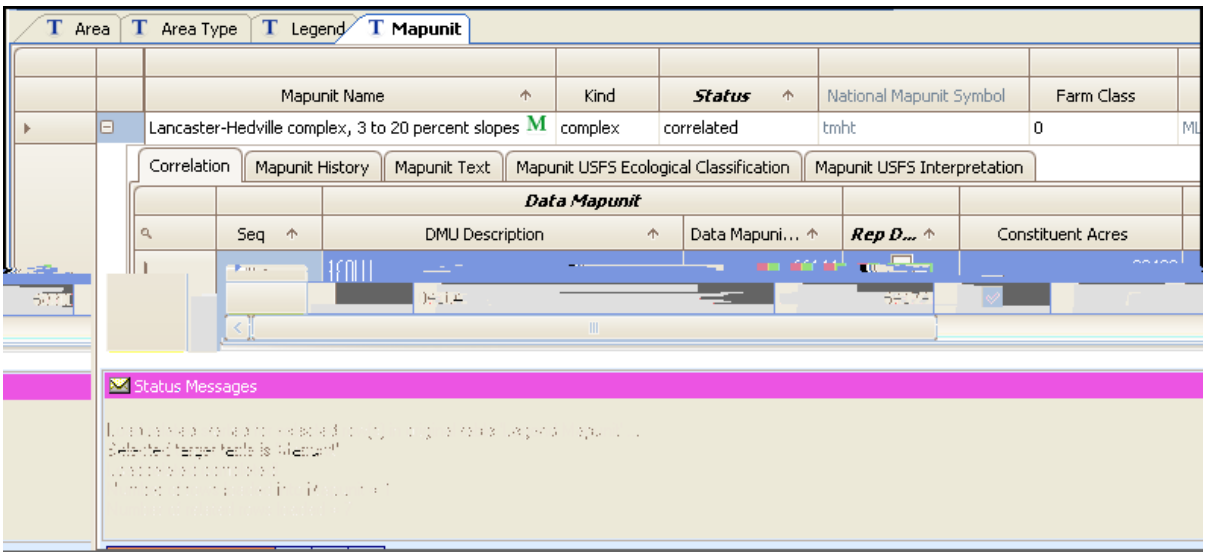


The Mapunit table is chosen from the parameter choice list:



This loads the specific map unit into the “selected set”.

The next step is to view the map unit. The Mapunit table is opened from the Explorer menu and the Mapunit Object (parent and child tables) is viewed beginning with the Mapunit table:



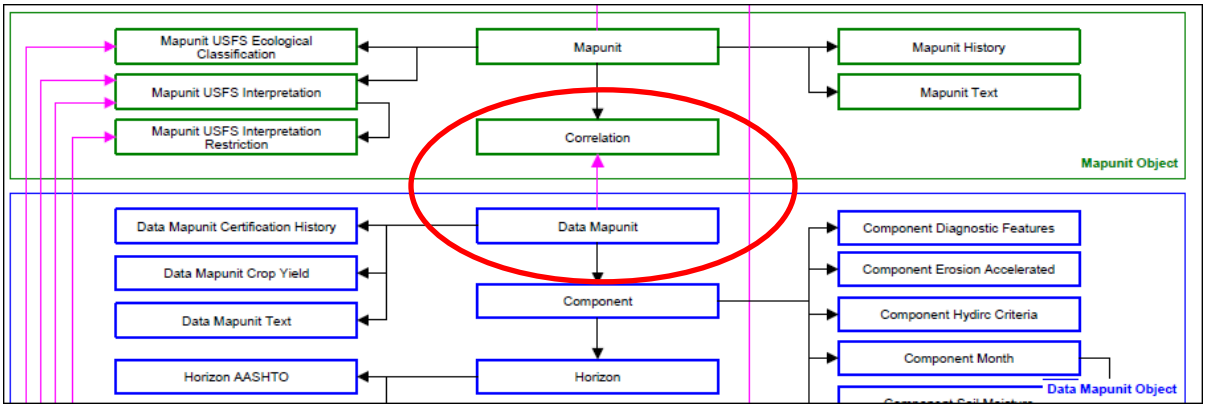
Review the data contained within the mapunit table and its various child tables. There are five child tables:

The Correlation table contains the links to the mapunits' data.
The Mapunit History table documents the map unit's correlation events.
The Mapunit Text stores documentation on the map unit.
The two USFS tables are designed for future use.

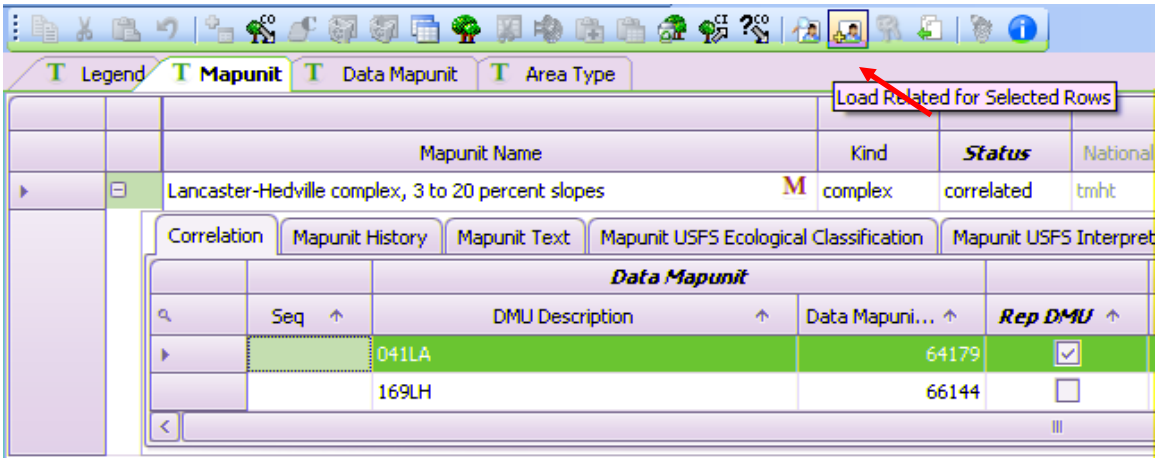
The Data Mapunit Object

The Area Type Object has been loaded and reviewed.
The Legend Object has had a survey loaded and reviewed.
The Mapunit Object has had a mapunit loaded and reviewed.

The Data Mapunit Object is designed to capture the soil properties, qualities and interpretations for each component within the map unit concept. The boundaries between these independent objects will be crossed using the Load Related command to load data into the Data Mapunit Object.

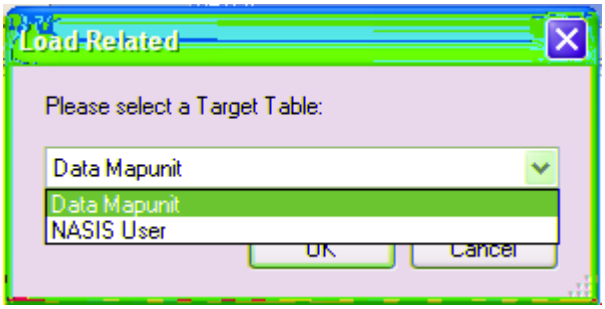


Returning to NASIS, in the Correlation table, notice that one record is designated a representative data mapunit (Rep DMU) and one is not designated by the check mark in the "Rep DMU" column.

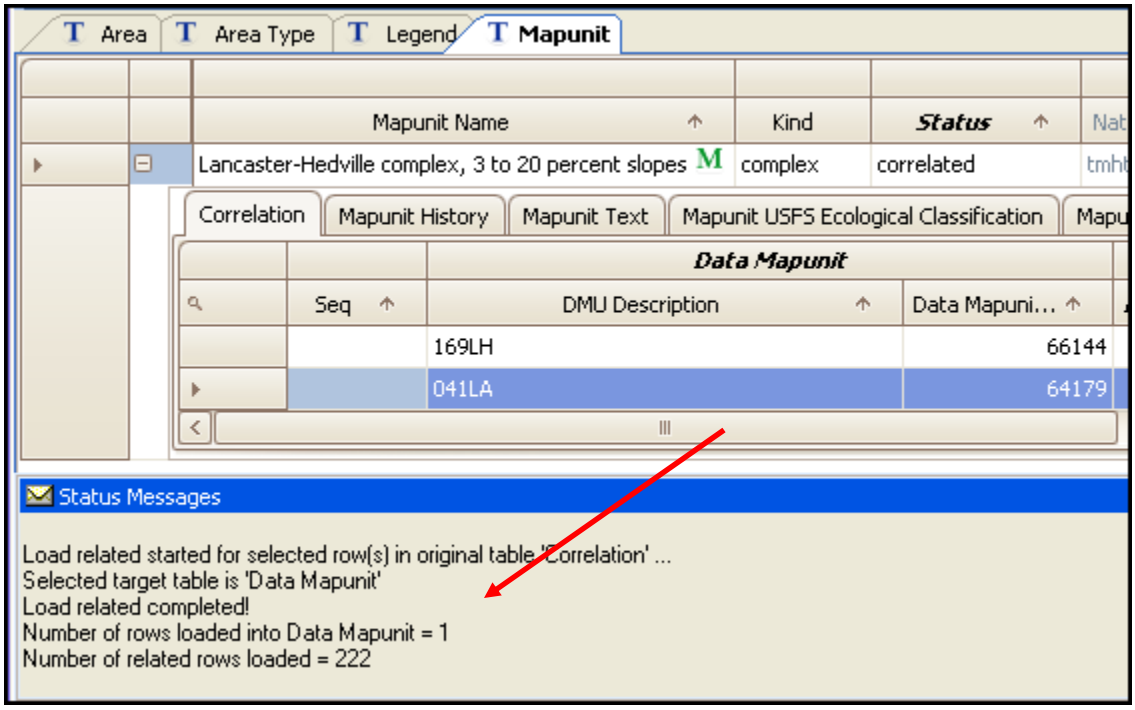


Highlight the row designated as the representative data mapunit.
Choose the Editor Toolbar icon "Load Related for Selected Rows" or from the Table Editor menu.

The choice list appears. Select Data Mapunit.

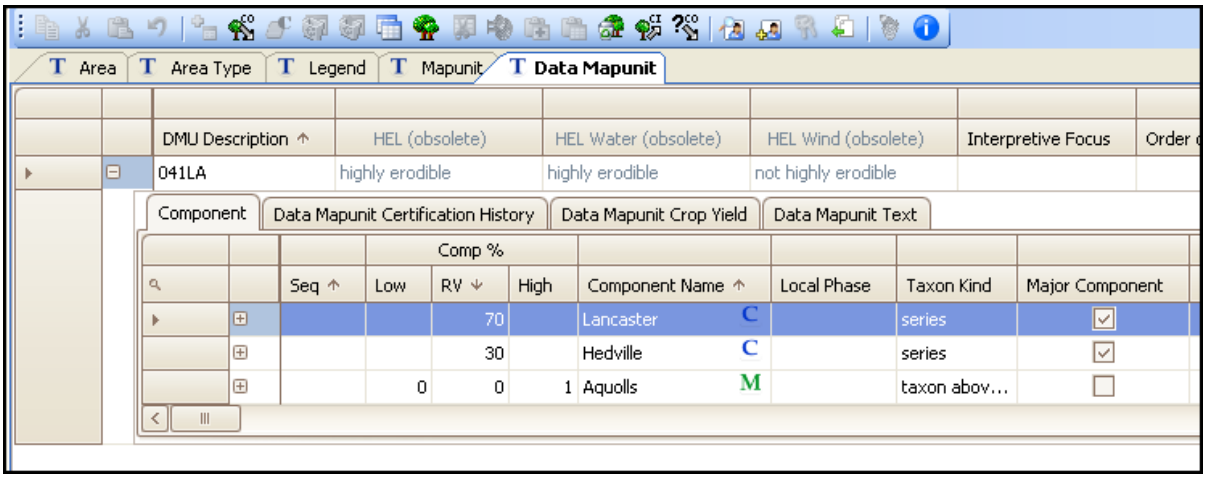


A message appears in the message panel indicating that one row was added to the selected set. An additional 222 related rows are also added to the selected set.

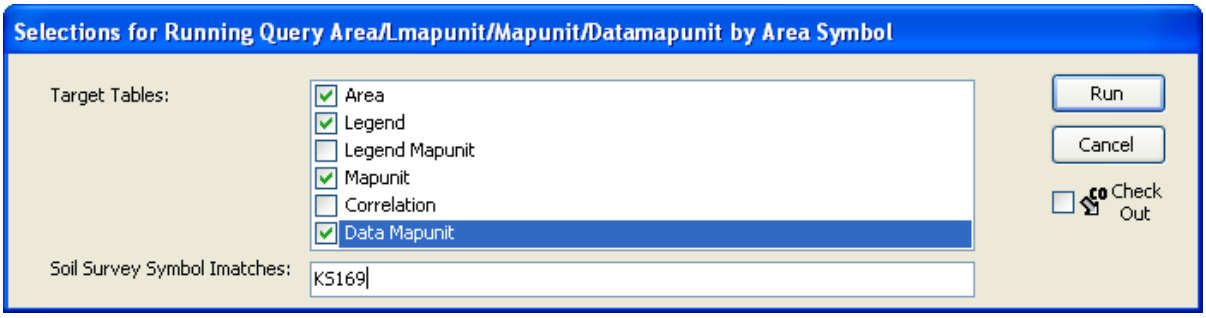


This process loads the specific DMU into the “Selected Set”. The data is available and now must be viewed.

To review the data open the Data Mapunit table from the Tables Explorer. Review the child tables associated with the Data Mapunit Object.



NOTE: This entire exercise could have been completed by loading all data using a single query and choosing the appropriate Target Tables:



Using this query would load all data associated with the specific survey area. The purpose of this exercise was to show the method of using the “Load Related” command. “Load Related” allowed the loading of specific rows of data.

Summary:

The database manages tables using “Objects” which are used to group tables of similar data. There is independence between the database objects. This independence allows objects to be linked to one another.

- A Data Mapunit stores the soil properties, qualities and interpretations for a given map unit concept.
- A Data Mapunit can be linked to multiple Mapunits (or a single map unit).
- A Mapunit can be linked to multiple Legends (or a single legend).
- A Legend is linked to only one Area.

The information in the Area Type Object is downloaded to the Local Database upon database initialization.

The National Database must be queried to populate the Local Database with the Legend, Mapunit and Data Mapunit information.

The Local Database is then queried to populate the Selected Set.

The Selected Set is used to view, analyze, edit and report soils information.

The Load Related command on either the Table Editor menu or the icon on the Table Toolbar can be used to load data from one database object into another database object.